



PLASMA CONFINEMENT FACILITIES

INDUSTRIAL INVOLVEMENT

At the heart of the magnetic fusion program are the facilities in which experiments are performed by fusion researchers. These facilities, located at national laboratories, at universities, and in industry, are the products of a continuing interchange between the fusion research community and industry. The complex task of designing, fabricating, and constructing fusion facilities has involved the transfer of technology from the fusion program to industry and has required the development of new industrial skills with applications both within and beyond fusion. Industry is positioned to continue and expand this relationship in the construction of the next generation of fusion experiments.

Since the initiation of magnetic fusion research in the 1950s, the fusion knowledge base and the understanding of plasma behavior have steadily expanded. This progress has occurred through research on increasingly sophisticated plasma confinement facilities, in which new theories are tested, new technologies are launched, and new insights are obtained. The success of these facilities is due in large part to the accomplishments of the nation's industries.

Today's plasma confinement facilities are equipped with all of the

necessary systems for production, control, and analysis of plasmas with properties approaching those needed for a fusion reactor. The designs for new facilities, in which the scientific and technological feasibility of fusion power will be demonstrated, are now on the drawing boards—or, more accurately, in the memories of computer-aided design systems.

Examples of past and present facilities include the Tokamak Fusion Test Reactor (shown below) and the Princeton Beta Experiment, both at the Princeton Plasma Physics Laboratory; the DIII-D

tokamak at General Atomics; Alcator C-Mod at the Massachusetts Institute of Technology; the Mirror Fusion Test Facility at Lawrence Livermore National Laboratory; the Advanced Toroidal Facility at Oak Ridge National Laboratory; and the Texas Experimental Tokamak at the University of Texas.

A common theme associated with all of these facilities is that industrial involvement has been essential to their success. Levels of involvement have varied among facilities; industry's contributions have included industrial system integration; hardware design, fabrication, and installation; research and development; building design and construction; and system testing.

Examples of companies in the United States that have contributed to fusion research include Bechtel, Ebasco, General Dynamics, Grumman, Hughes, McDonnell Douglas, RCA, TRW, Varian, and Westinghouse. General Atomics has an organizational unit that is devoted solely to fusion research and development. In the course of the fusion program, new companies have been established to take skills gained in the program to a larger market.

Looking to the future, a new facility, the superconducting Tokamak Physics Experiment (TPX), is now in the conceptual

